

Tripoli Research Safety Code

January 2010

1. Administration

1.1. Scope

- 1.1.1. This code shall apply to all individuals who wish to participate in Tripoli Research Launches.
- 1.1.2. This code shall apply to the design, construction, limitations to the kinds of propellants, their mass and power as used at a Tripoli Research Launch.
- 1.1.3. This code shall apply to other activities explicitly described herein as permitted at Tripoli Research Launches that do not involve the use of research motors.
- 1.1.4. This code shall not apply to the self-manufacture or process of manufacture of rocket motors or propellants for an individual's own use.

1.2. Purpose

- 1.2.1. The purpose of the Tripoli Research Program is to foster the research and development of payloads, electronics, recovery devices, air frame design, and construction materials.
- 1.2.2. It is the purpose of Tripoli to sanction and insure legal Tripoli Research activities as set forth in the Articles of Incorporation, Article III (a), (b), and (f).
- 1.2.3. The purpose of this code is to provide reasonable safety guidelines for the use of members of the Tripoli Rocketry Association at Tripoli Research Launches.
- 1.2.4. It is the purpose of this code to provide a means to introduce new technology or to include currently prohibited technology into Tripoli Research activities as the ability and expertise of these technologies becomes available.
- 1.2.5. This code is an extension to the Commercial High Power Rocketry Code. It is to be used to clarify the additional rules that govern Tripoli Research Launches. Fliers and launch organizers that participate in Tripoli Research Launches are governed by both safety codes.

1.3. Enforcement

- 1.3.1. This code shall be enforced according to the provisions set forth in the Articles of Incorporation and Bylaws of the Tripoli Rocketry Association, Inc., and the operating rules approved by the Board of Directors (BOD).

2. Referenced Publications

2.1. General

- 2.1.1. Some of the documents or portions thereof listed in this chapter are referenced within this code and shall be considered part of the requirements of this document except for such requirements modified or waived in this code.
- 2.1.2. TRA Publications. Tripoli Rocketry Association, Inc., P. O. Box 87, Bellevue NE 68005.
 - Articles of Incorporation and Bylaws*, 1999 edition.
 - High Power Rocketry Safety Code*, 1998 edition.
 - Tripoli Motor Testing Committee (TMT), Testing Policies*, 2009 edition

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2.1.3. NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy MA 02269-9101.

NFPA 1122, Code for Model Rocketry 2008 edition.

NFPA 1127, Code for High Power Rocketry, 2008 edition.

3. Definitions

3.1. General

3.1.1. The definitions contained in this chapter shall apply to the terms used in this code. Where terms are not included, common usage of the terms shall apply.

3.2. Tripoli Research Definitions

3.2.1. BOD. Board of Directors of the Tripoli Rocketry Association, Inc.

3.2.2. Rocket Motor. As used in this code, Rocket Motor shall refer only to Composite Propellant, Sugar Propellant, commercial black powder, and Hybrid Rocket Motor.

3.2.2.1. Certified Motor. Any commercial motor which has been certified by Tripoli Motor Testing (TMT) and/or NAR Standards and Testing (S&T) and/or CAR Motor Certification Committee, or at one time was certified and has expired, or has been decertified.

3.2.2.2. Composite Propellant Rocket Motor Any device as defined under Rocket Motor that utilizes a propellant charge consisting primarily of an inorganic oxidizer dispersed in a carbonaceous polymeric binder.

3.2.2.3. Hybrid Rocket Motor. A rocket motor in which the fuel exists in a different physical state (solid or gaseous) than the oxidizer and that derives its force or thrust from the combination thereof.

3.2.2.4. Research Motor. Any non-certified motor made for personal use that may or may not contain commercially available components. Research motors shall not be sold or distributed for a profit.

3.2.2.5. Sugar Propellant Rocket Motor. A propellant charge containing potassium nitrate as the primary oxidizer, and containing either dextrose or sorbitol or erythritol as the primary fuel and binder.

3.2.3. Research Rocket. Any rocket flown at a Tripoli Research launch.

3.2.4. Range Safety Officer (RSO). A Tripoli Level 2 or Level 3 member who is responsible for the safety of the launch.

3.2.5. Launch Director (LD). A Tripoli Level 2 or Level 3 member who has overall administrative responsibility for the launch.

3.2.6. Launch Site. The primary parcel of land from which research activities are conducted and all adjacent parcels which are owned by the same property owner, or other property owners, and who have granted written permission for Tripoli Research Launch activities to be conducted on their property. This includes the Launch Area and Preparation Area.

3.2.6.1. Launch Area. An area or areas designated by the Launch Director or Range Safety Officer from which research rockets are launched or motors are static tested.

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- 3.2.6.2. Preparation Area.** An area designated by the Launch Director or Range Safety Officer in which research motors, research rockets, or electronic components for research rockets are prepared for launching or static testing.
- 3.2.7. Tripoli Regular or Certified Launch.** Any Tripoli sanctioned and insured launch where only certified motors may be flown.
- 3.2.8. Shall.** Indicates a mandatory requirement.
- 3.2.9. Tripoli (TRA).** Tripoli Rocketry Association, Inc.
- 3.2.10. TRC** Tripoli Research Committee
- 3.2.11. Tripoli Research Launch.** Any Tripoli Research sanctioned and insured launch where research activities, as described in this code, may be conducted.

4. Limits of Liability

4.1. Use

- 4.1.1.** The use of all motors at Tripoli Research Launches shall be conducted in accordance with this code.

4.2. Disclaimer

- 4.2.1.** The Tripoli Rocketry Association does not in any way participate in the manufacturing or fabrication process of Research Rocket Motors or propellants.
- 4.2.2.** The Tripoli Rocketry Association does not regulate, approve, or officially support or endorse any propellant manufacturing or fabrication process, or in any way imply such approval.
- 4.2.3.** The Tripoli Rocketry Association does not endorse or provide any safety codes for the self- manufacture of any propellant.
- 4.2.4.** The Tripoli Rocketry Association does not regulate the storage of rocket motors.
- 4.2.5.** The publishing or reporting of any research rocketry activity in any publication shall not imply TRA endorsement of any research activity or endorsement of any research manufacturing or fabrication procedure.

4.3. Legality

- 4.3.1.** The Tripoli Rocketry Association does not claim Research Rocketry to be legal in every municipality or in every state.
- 4.3.2.** Participants in the Tripoli Research program shall comply with all local, municipal, state, and federal regulations where said activities are conducted.

4.4. Insurance

- 4.4.1.** The Tripoli Rocketry Association supports Tripoli Research activities where said activities are conducted legally.
- 4.4.2.** Tripoli Research activities are only insured when the provisions of this code are followed.

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- 4.4.3. No Tripoli member shall imply to any authority or landowner that Tripoli Research activities are insured when, due to not following the provisions of this code, they are not.

5. Exclusions

5.1. Black Powder Rocket Motors

- 5.1.1. Black powder-based research motors shall not be included as composites, regardless of binder and/or formulation modifications. Certified black powder motors are not excluded by this code.

5.2. Liquid Rocket Motors

- 5.2.1. With the exception of nitrous-oxide hybrid rocket motors, liquid rocket motors are prohibited at Tripoli Research Launches. BOD approval may be given for very well documented liquid motor projects.

5.3. Additional Prohibited Propellants

- 5.3.1. The following propellants shall also be excluded from Tripoli Research launches: double- and triple-based propellants, and micro-grain propellants, including zinc/sulfur propellants.

6. Process of Inclusion

6.1. General

- 6.1.1. A proposal for the introduction of new technologies and the inclusion of currently prohibited technologies into the Tripoli Research program shall be submitted, in writing, by one or more Tripoli Research members to the Tripoli Research Committee (TRC) for review, after which the proposal is forwarded to the BOD.
- 6.1.2. The originator(s) of the proposal shall provide any and all technical documents that may be requested by the TRC and/or the BOD.
- 6.1.3. Following review, the TRC and BOD may set a time and location for a demonstration of the requested technology, as is deemed necessary by the TRC and BOD.
- 6.1.4. After demonstration and testing, the TRC and BOD shall determine whether or not to introduce the requested technology into the Tripoli Research program.
- 6.1.5. Acceptance of new technology shall be based on technical data, and/or on review of any federal regulations that may impact the association or the hobby with the inclusion of any new technology, and/or on the impact of said technology on TRA insurance coverage.
- 6.1.6. If the requested technology is introduced, the TRC shall recommend any necessary changes to this code to safely introduce said technology for Tripoli Research use.
- 6.1.7. Any new technology approved shall be used in accordance with this code and any future requirements that may be added to this code.

7. Tripoli Research Launches

7.1. Launch Scheduling

- 7.1.1. All Tripoli Research launches shall take place at a time which is to be separated from any other Tripoli Regular or Certified launch, or any other non-TRA launch, at that same site by no less than 8 hours and a change of calendar date.

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- 7.1.2. Operating separate range heads at separate locations on the same or adjacent property shall not meet this requirement unless launch/firing times for Tripoli Regular or Certified flights (or any non-TRA flights), and Tripoli Research flights are separated by no less than 8 hours and a change of calendar date.

7.2. Participation

- 7.2.1. All flyers at a Tripoli Research Launch shall be members of Tripoli in good standing and 18 years of age or older.
 - 7.2.1.1. Individuals under age 18 shall not be present in the launch area.
 - 7.2.1.2. The LD/RSO has the right to restrict access of anyone under the age of 18 to any Tripoli Research activity, including motor preparation, launch or test firing areas.
- 7.2.2. All flights and static tests conducted by the member shall be within the member's certification level, with the exception of permitted TRA flyer certification attempts, using certified rocket motors.
- 7.2.3. All flights and static tests that use research motors shall be conducted by Tripoli members who are Tripoli certified level 2 or 3.
- 7.2.4. The member shall provide proof of membership and certification status by presenting their membership card to the LD or RSO upon request.
- 7.2.5. Group Project Participants
 - 7.2.5.1. All participants in a group project shall be Tripoli members in good standing, or invited guests of the Tripoli member(s) of the group project. All group projects must have a minimum of one Tripoli member in good standing as the flyer of record, with a flyer certification level sufficient for the installed impulse of the project.
 - 7.2.5.2. A person who makes the research motor(s) for a Tripoli Research group project may do so only if he/she is an official member of said group, and may collect only the costs (without profit) for materials used to produce the motor(s) for use in the group project.
 - 7.2.5.3. The person who makes the research motor(s) for a Tripoli Research group project shall be physically present at that Tripoli Research group project flight, and shall retain possession of the rocket motor(s) for the group project until such time as the motor(s) are installed.

7.3. Attendance by Non-Tripoli Members (Invited Guests and Spectators)

- 7.3.1. Non-Tripoli members are either invited guests or spectators.
- 7.3.2. Tripoli members shall be responsible for the conduct of their invited guests.
- 7.3.3. An invited guest (including non-Tripoli members of a group project) may be permitted in the preparation areas upon approval of the RSO but may not be present at the launch area.
 - 7.3.3.1. Non-Tripoli Members age 18 and over that are students of an accredited educational institution may participate in joint projects with Tripoli members. These individuals are allowed in the launch area if escorted by a Tripoli member.
- 7.3.4. Spectators, who are neither TRA members nor invited guests, shall be confined to the spectator areas as designated by the RSO and shall not be present in the motor/rocket preparation areas nor at the launch site.

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7.3.5. Invited guests or spectators who meet all the other requirements of this code may have access to these restricted areas if they join TRA and have the permission of the RSO and the person or group personnel involved in a project.

7.4. Prohibitions

7.4.1. Research motors shall not be used for certification flights.

7.4.2. Research motors shall not be fabricated of steel or other frangible materials.

7.4.2.1. Cases, front and rear closures, and nozzles shall not be fabricated of steel.

7.4.2.2. Screws, washers, compression rings and related closures, and sealing devices shall be exempt from requirement 7.5.2.1

7.4.3. A rocket motor shall not be ignited by any of the following:

A switch that uses mercury.

“Pull wires” that disconnect or complete a circuit

“Pressure roller” switches

7.4.4. No range activity shall be conducted when a thunderstorm has been sighted within ten miles or less of the launch site or if audible thunder or lightning is present.

7.5. Distances

7.5.1. The maximum launch altitude for flights containing research motors shall be 75% of the waiver altitude established for the launch.

7.5.1.1. The BOD may waive this requirement when it can be demonstrated (by past performance, actual thrust curves, etc.) that the performance of the motor(s) to be used shall not exceed the limits of the waiver.

7.5.1.2. Computer simulations without actual thrust data derived from one or more actual test stand firings shall not satisfy the requirements of 7.8.1.1

7.5.2. The minimum safe standoff distance for any research flight and or research static test shall be per the table below.

Minimum Safe Standoff Distances

Total Installed Impulse, N-s		Motor type	Non-Complex, feet	Complex, feet
0.01 to	1,280	A-J	200	250
1,280.01 to	2,560	K	250	350
2,560.01 to	5,120	L	300	500
5,120.01 to	10,240	M	500	1,000
10,240.01 to	20,480	N	1,000	1,500
20,480.01 to	40,960	O	1,500	2,000
40,960.01 to	890,000	P-T	2,000	2,500

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- 7.5.2.1. The Launch Director or Range Safety Officer may, at their discretion, require greater standoff distances.

7.6. Tripoli Certifications

- 7.6.1. Tripoli certification flights shall be permitted at Tripoli Research launches only for fliers using certified motors.

7.7. Launch Director and Range Safety Officer

- 7.7.1. The LD/RSO may, for any reason, refuse to allow the launch or static testing of any rocket motor or rocket that he or she deems to be unsafe.
- 7.7.2. Decisions of the Launch Director and/or the Range Safety Officer shall, in every case, be final.

7.8. Approved Motors

- 7.8.1. Research motors and certified motors shall be allowed at a Tripoli Research Launches

7.9. Launch Approval and Insurance Coverage

- 7.9.1. The Tripoli Research launch approval application form, available from the Tripoli web site, shall be submitted at least fifteen (15) calendar days in advance of the launch date to the TRC Chairman.
- 7.9.2. It is the responsibility of the Launch Director to insure that the Tripoli Research launch is insured. All Tripoli Research launches must be insured.

7.10. Record Keeping

- 7.10.1. A flight card shall be filled out for each research flight or static test.
- 7.10.2. Upon the request of the BOD or the TRC Chairman, flight cards shall be made available to the TRC for study and review.
- 7.10.3. Flight cards shall be kept for 1 year from the date of the launch.

7.11. Other Applicable Codes

- 7.11.1. For any activity not explicitly addressed by the rules and guidelines of this code, the applicable provision(s) of the TRA High Power Rocketry Safety Code shall be in effect at all Tripoli Research Launches.

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8. Waived Rules and Exceptions

8.1. Application for Waiver or Exceptions

- 8.1.1.** Any provision of this code waived or excluded by the BOD shall be on a case-by-case basis.
- 8.1.2.** Application for exceptions to any provision of this code shall be submitted in writing to the BOD.
- 8.1.3.** In the event that BOD approval for waiver or exclusion from any provision of this code is granted, said approval shall apply only to a single event, at a single location.